

**Level Best**

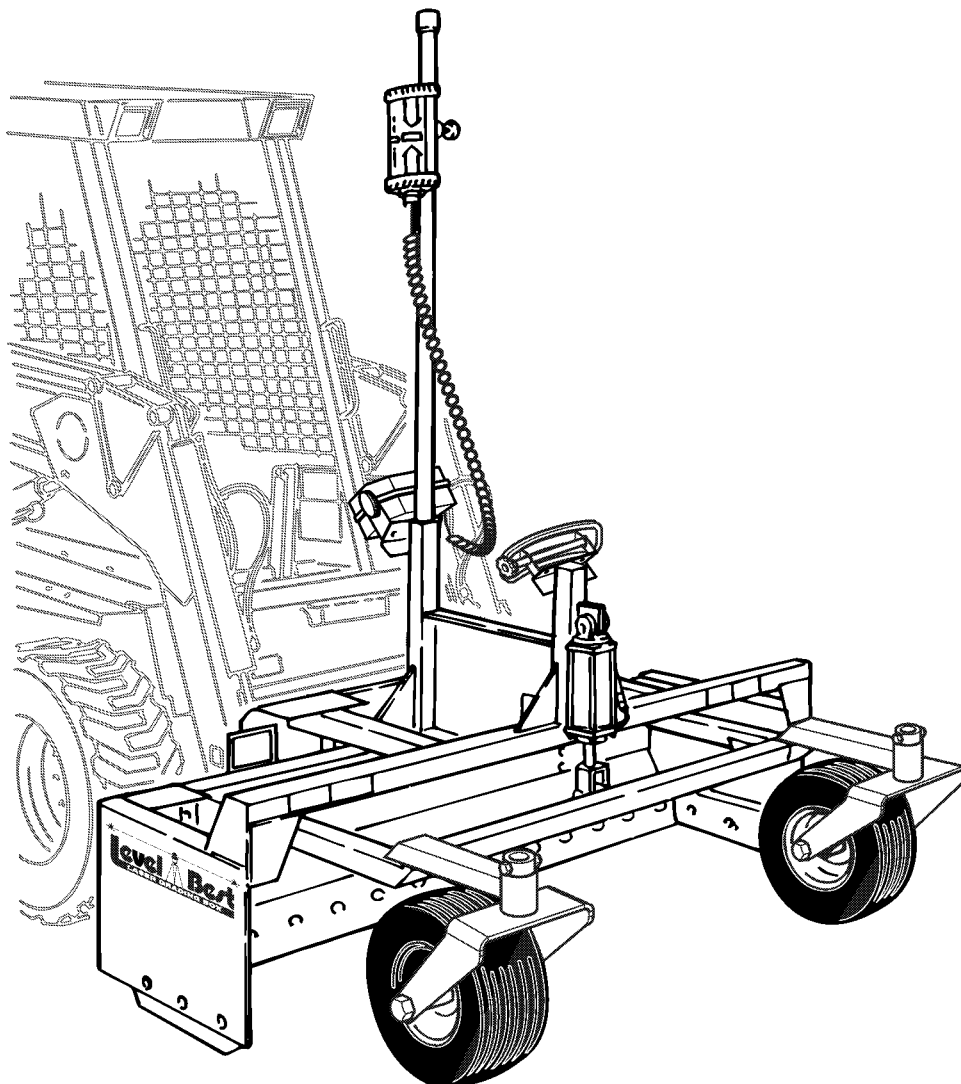
**LASER GRADING BOX**

# **OPERATORS MANUAL**

**FOR**

**SKID STEER - SINGLE**

**LASER ALIGNMENT**



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### **DISCLAIMER**

THE INFORMATION IN THIS MANUAL IS PROVIDED TO PROMOTE THE SAFE USE OF, AND ASSIST THE OPERATOR IN ACHIEVING THE BEST PERFORMANCE FROM, THE LASER GRADING BOX DESCRIBED HEREIN, FOR THEIR INTENDED APPLICATIONS.

# STANDARD MODELS

<b>Part Number</b>	<b>Model Number</b>	<b>Description</b>
315-046-000	LBSS6	Box, Grader, Skid Steer, Single, 6', Cylinder Only
315-047-000	LBSS7	Box, Grader, Skid Steer, Single, 7', Cylinder Only
315-048-000	LBSS8	Box, Grader, Skid Steer, Single, 8', Cylinder Only
315-049-000	LBSS6L	Box, Grader, Skid Steer, Single, 6', with Hydraulics for Laser Alignment
315-050-000	LBSS7L	Box, Grader, Skid Steer, Single, 7', with Hydraulics for Laser Alignment
315-051-000	LBSS8L	Box, Grader, Skid Steer, Single, 8', with Hydraulics for Laser Alignment
315-052-000	LBSS6LC	Box, Grader, Skid Steer, Single, 6', with Hydraulics & Controls for Laser Alignment
315-053-000	LBSS7LC	Box, Grader, Skid Steer, Single, 7', with Hydraulics & Controls for Laser Alignment
315-054-000	LBSS8LC	Box, Grader, Skid Steer, Single, 8', with Hydraulics & Controls for Laser Alignment

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# SAFETY INFORMATION

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This manual is furnished to you, the owner/operator, as a guide to get the greatest benefit from your Grading Box. ATI Corporation wants you to be able to get the most use out of your Grading Box through safe and efficient operation.

Before attempting to operate the Grading Box, carefully read all sections of this manual. Be sure that you thoroughly understand all of the safety information and operating procedures.

## SAFETY PRECAUTION DEFINITIONS

**Dangers, Warnings, Cautions, and Notes** are strategically placed throughout this manual to further emphasize the importance of personal safety, qualifications of operating personnel, and proper use of the tiller in its intended application. These precautions supplement and/or complement the safety information decals affixed to the unit and include headings that are defined as follows:



**DANGER** Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



**WARNING** Indicates a potentially hazardous situation or practice which, if not avoided, could result in death or serious injury.



**CAUTION** Indicates a potentially hazardous situation or practice which, if not avoided, will result in damage to equipment and/or minor injury.

**NOTE:** Indicates an operating procedure, practice, etc., or portion thereof, which is essential to highlight.

- Always use caution and safe operating practices when operating this equipment.
- Always set the Automatic/Manual Switch on the Control Panel to MANUAL before leaving the operator's seat or whenever the machine is not moving.

- Always allow for clearance under the cutting edge of the machine when tuning the system or when switching to automatic control. Insufficient clearance could cause the machine to lift itself off the ground as its cutting edge attempts to achieve the programmed slope.
- Never adjust the position of the Laser Sensor when the system is in automatic control.
- Never perform service work on your machine or the Automatic Control System when the system is in automatic control.
- Install all safety panels and guards before operating your equipment.
- Stay clear of all moving parts when the machine is in operation.
- Keep all people clear of the machine when it is running.
- Keep feet and other body parts from under the cutting edges of the machine at all times.
- Read and comply with all safety recommendations of your Tractor/Skid Steer manufacturer, as outlined in its operator and service manuals.

**NOTE:** References made to left, right, front, and rear are those directions viewed when facing the unit from the rear.

**NOTE:** Some equipment depicted in illustrations may not reflect exact production model configurations.

**NOTE:** All safety, operating, and servicing information reflects current production models at the time of publication of this manual.

**NOTE:** ATI Corporation reserves the right to discontinue models at any time, change specifications, and improve design without notice and without incurring obligation on goods previously purchased and to discontinue supplying any part listed, when the demand does not warrant production.

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## WARRANTY

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This Laser Grading Box is designed and manufactured to high quality standards. ATI Corporation, therefore, guarantees this Laser Grading Box to be free from defect in workmanship and materials for three years from purchase date. **If the machine is used for rental purposes, the warranty is limited to ninety (90) days.**

Vendored Components and Control Valve Parts are warranted separately by their respective manufacturers.

Does not cover normal wear or failure due to hydraulic oil contamination.

Misuse, abuse, misapplication, and unauthorized alterations will void this warranty.

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# SECTION I

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## SYSTEM FEATURES AND BASIC OPERATION

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# SYSTEM FEATURES AND BASIC OPERATION

## Purpose

The Automatic Control System is designed for accurate control and on-grade performance. It functions as follows:

A Laser Beacon rotates to provide a reference plane of laser light (Refer to Figure 1-1) over an entire job site. This plane of laser light can be level, single-slope, or dual-slope.

A 360° Laser Sensor, mounted to a mast pole directly over the cutting edge of the box, receives (senses) the plane of laser light. The Grade Position LEDs on the Laser Sensor flash to indi-

cate the location of the box's cutting edge relative to the required finished grade (The Control Panel has a set of LEDs that mimic the Laser Sensor's LEDs).

- In manual control, the operator watches the Grade Position LEDs and uses the box's controls to keep the center LED lit, thereby keeping the box "On Grade".
- In automatic control, the Automatic Control System controls the box's hydraulic cylinder to keep the center LED lit, thereby keeping the box "On Grade".

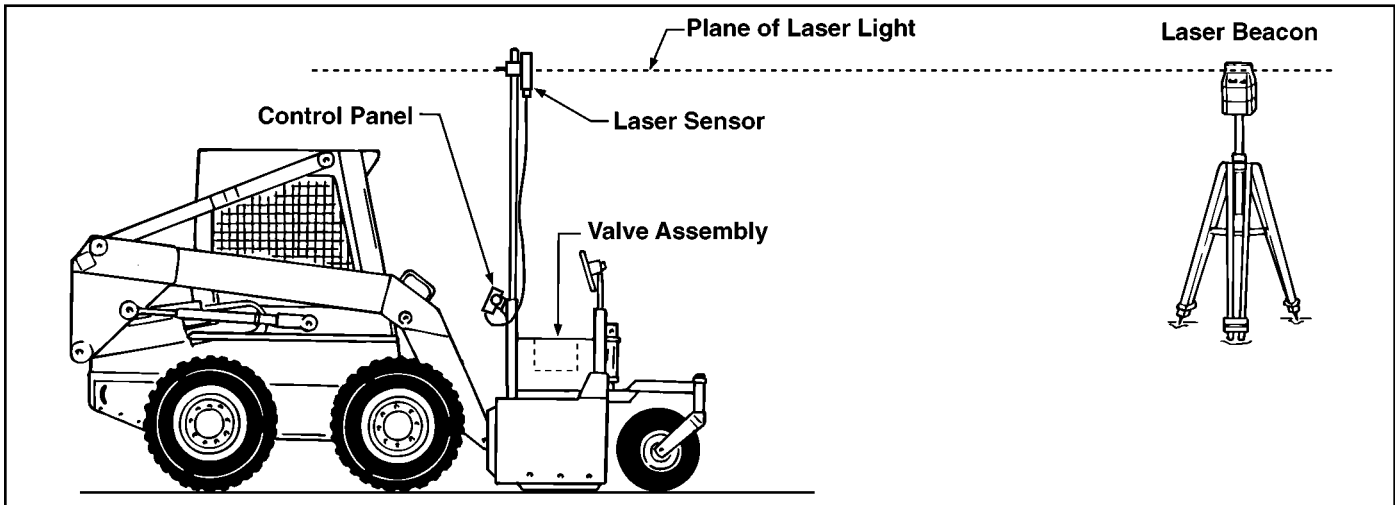


Figure 1-1 Plane of Laser Light with Components of the Automatic Control System

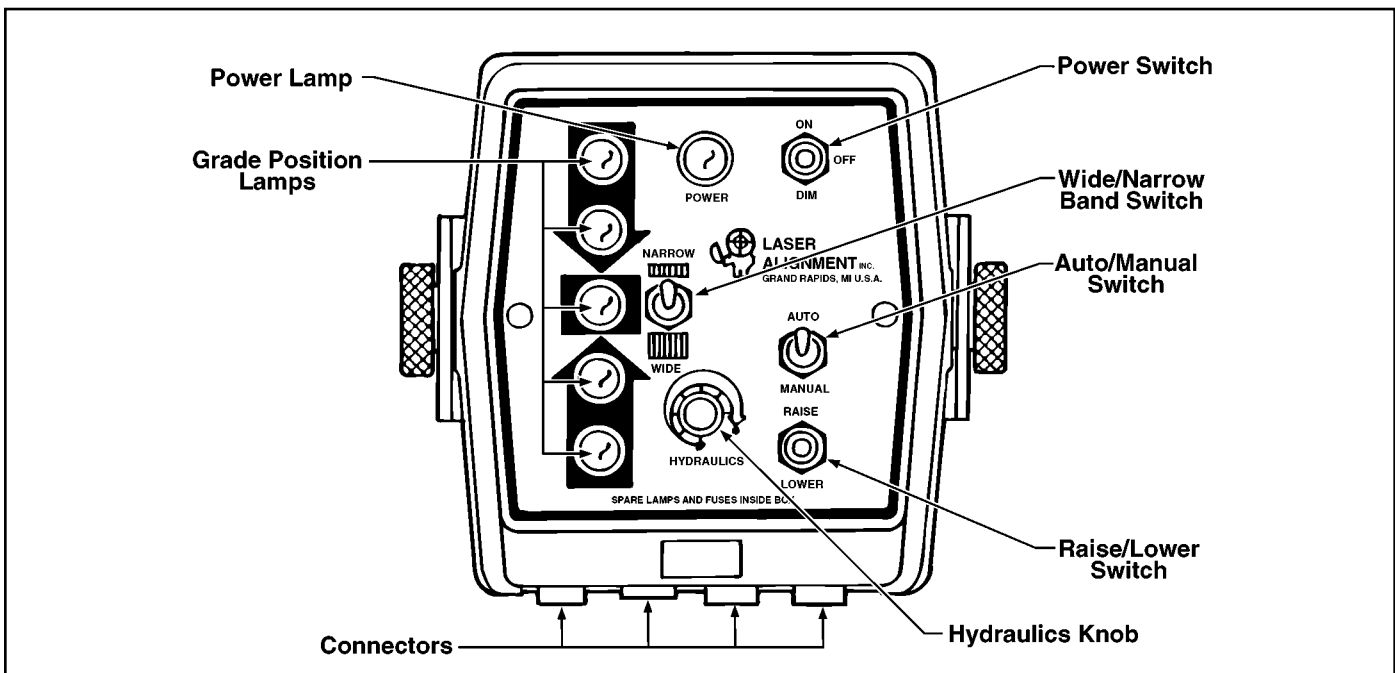


Figure 1-2 Control Panel Features

# SYSTEM FEATURES AND BASIC OPERATION

## Components

### Control Panel

The Control Panel (Refer to Figure 1-2) should be mounted where the operator can easily access the switches and view the indicator lamps. The Control Panel is the main control unit for the Automatic Control System. It shows information and accepts input from operators.

The Control Panel has indicator lamps to show power and grade position information. The panel also has switches and a knob that allow operators to set up and use the box quickly and easily.

See the next two pages for descriptions of the panel's components.

- **Power Switch.** (Refer to Figure 1-3) Allows operators to control power to the system.
  - **On.** Power is applied to the system and the Control Panel Lamps are lit at full brightness.
  - **Off.** Power is removed from the system.
  - **Dim.** Power is applied to the system and the Control Panel Lamps are dimmed for ease of use at night.

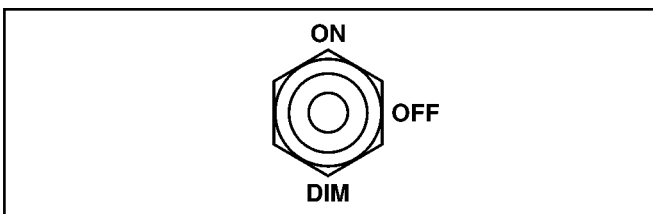


Figure 1-3 Power Switch

- **Power Lamp.** (Refer to Figure 1-4) Indicates power is applied to the system. Becomes lit when the Power Switch is in its **ON** or **DIM** position.

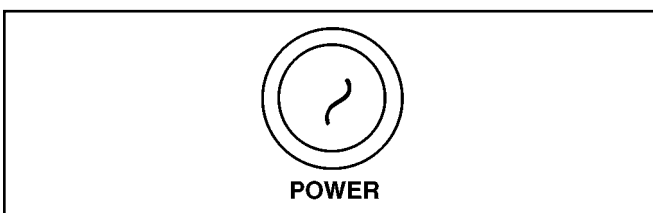


Figure 1-4 Power Lamp

- **Grade Position Lamps.** (Refer to Figure 1-5) Indicate the position of the box's cutting edge relative to the plane of laser light from the Laser Beacon. These lamps function in the same way as the Grade Position LEDs on the Laser Sensor.
  - **Off Grade, High Lamp.** Indicates that the Laser Sensor is detecting the plane of laser light, but the cutting edge is above "On Grade".
  - **Near On Grade, High Lamp.** Indicates that the cutting edge is slightly above "On Grade".
  - **On Grade Lamp.** Indicates that the cutting edge is "On Grade".
  - **Near On Grade, Low Lamp.** Indicates that the cutting edge is slightly below "On Grade".
  - **Off Grade, Low Lamp.** Indicates that the Laser Sensor is detecting the plane of laser light, but the cutting edge is below "On Grade".

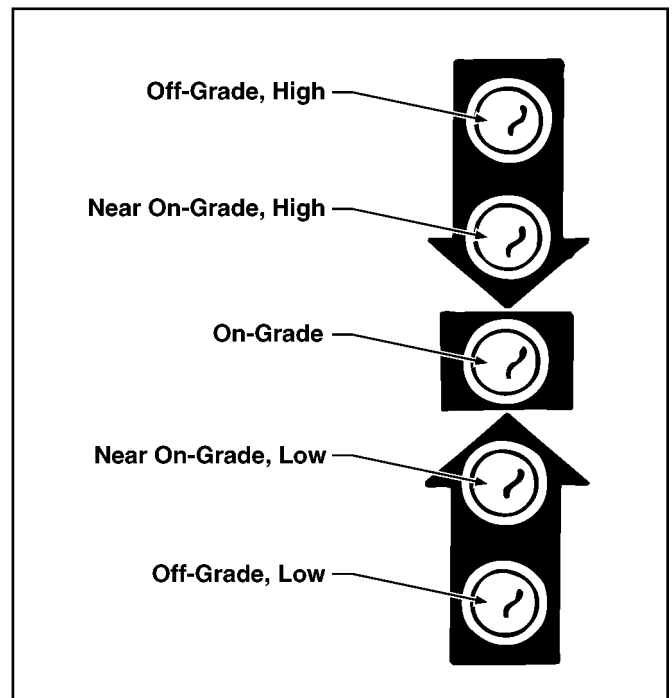


Figure 1-5 Grade Position Lamps

# SYSTEM FEATURES AND BASIC OPERATION

**Note:** The top and bottom lamps have a memory feature. If the Laser Sensor moves above or below the plane of laser light, the top or bottom lamp flashes slowly to indicate that the Laser Sensor is no longer receiving the laser light.

- **Narrow/Wide Switch.** (Refer to Figure 1-6) Allows operators to select the tolerance for what the Automatic Control System considers “On Grade”.
  - **Narrow.** The band for fine or finished grading,  $\pm 0.25$ " tolerance.
  - **Wide.** The band for rough grading,  $\pm 0.60$ " tolerance.

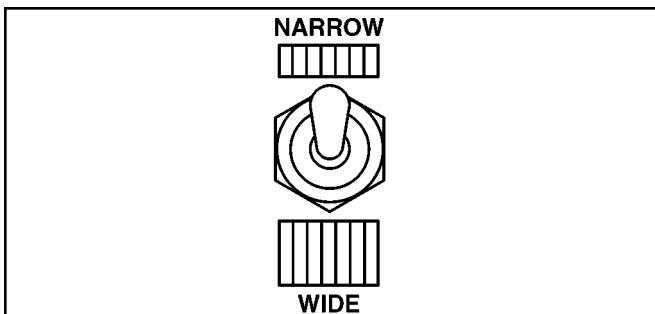


Figure 1-6 Narrow/Wide Switch

- **Hydraulics Knob.** (Refer to Figure 1-7) For machines with Directional Valve Assemblies, this knob allows operators to adjust the duration of the hydraulic’s pulses when the cutting blade is near “On Grade”. The knob normally will be set around the 1-2:00 o’clock range.

**Note:** This knob does not control the speed of the hydraulics. Turning the knob slightly counter-clockwise may make the Grading Box operate smoother in certain materials (ie: sand, etc.). By turning the knob counter-clockwise your system will not make as many corrections as it would by being turned fully clockwise.

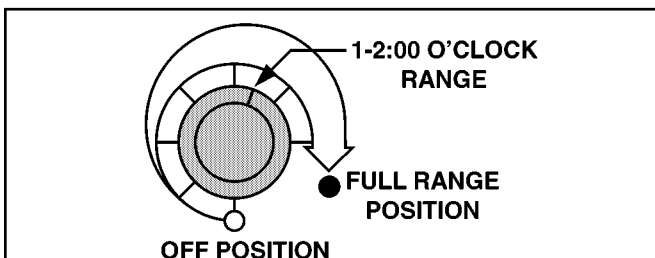


Figure 1-7 Hydraulics Knob

Example: The knob turned fully clockwise would make 10 corrections for 10 pulses. The knob turned 3/4 fully clockwise would make 7 corrections for 10 pulses.

- **Auto/Manual Switch.** (Refer to Figure 1-8) Allows operators to select between automatic and manual control.
  - **Auto.** The Automatic Control System controls the box’s hydraulics.
  - **Manual.** The operator views the Grade Position Lamps and uses the box’s controls or the Raise/Lower Switch to control the hydraulics.

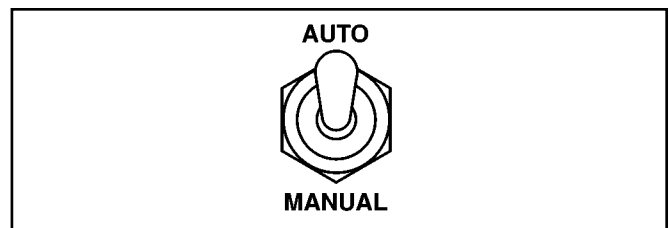


Figure 1-8 Auto/Manual Switch

- **Raise/Lower Switch.** (Refer to Figure 1-9) Allows operators to control the height of the blade (This switch functions no matter what the position of the Auto/Manual Switch).

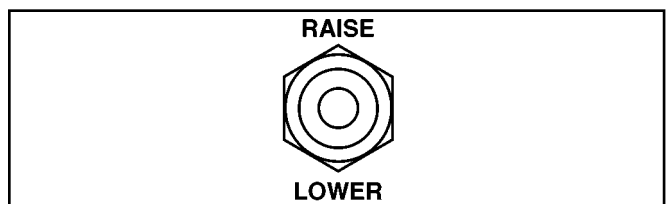


Figure 1-9 Raise/Lower Switch

- **Connectors.** (Refer to Figure 1-10) The Control Panel has three connectors and an Auxiliary Port.
  - **Laser Sensor.** Provides a connection for the sensor cable leading to the Laser Sensor.
  - **Auxiliary Port.** Provides a connection for the Remote Auxiliary Switch.
  - **Power Input.** Provides a connection for the power cable leading to the machine’s battery (The Automatic Control System can operate on 12 or 24 Volt machines).

# SYSTEM FEATURES AND BASIC OPERATION

- **Hydraulic Output.** Provides a connection for the solenoid cable leading to the Valve Assembly.

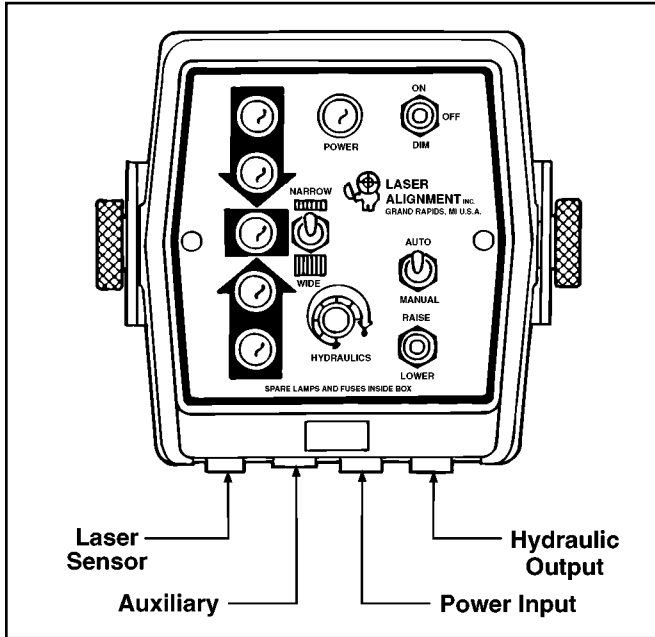


Figure 1-10 Cable Connectors

The Laser Sensor sends to the Control Panel the location of the plane of laser light. The Control Panel then has the Valve Assembly drive the box's hydraulics accordingly.

The Laser Sensor is a 360°, Five Channel Sensor. It receives (senses) the plane of laser light on all sides. The sensor has five LED clusters that show distinctly where the sensor is receiving the plane.

See this page and the next page for descriptions of the sensor's components (Refer to Figure 1-11).

- **Grade Position LEDs.** Indicate the position of the box's cutting edge relative to the plane of laser light from the Laser Beacon. These LEDs function in the same way as the Grade Position Lamps on the Control Panel, except they flash rapidly instead of lighting solidly (This makes the LEDs easy to see, even in the brightest sunlight). See the "Grade Position Lamps" under the Control Panel description for information on how the LEDs function.

## Laser Sensor

The 360° Laser Sensor is mounted on the mast pole directly above the cutting edge of the box. The sensor is the unit that detects the plane of laser light produced by the Laser Beacon.

- **Memory.** When the Laser Sensor moves from within the plane of laser light to out of the plane, the top or bottom Grade Position LED blinks slowly. This indicates whether the Laser Sensor is presently above or below the plane of laser light.

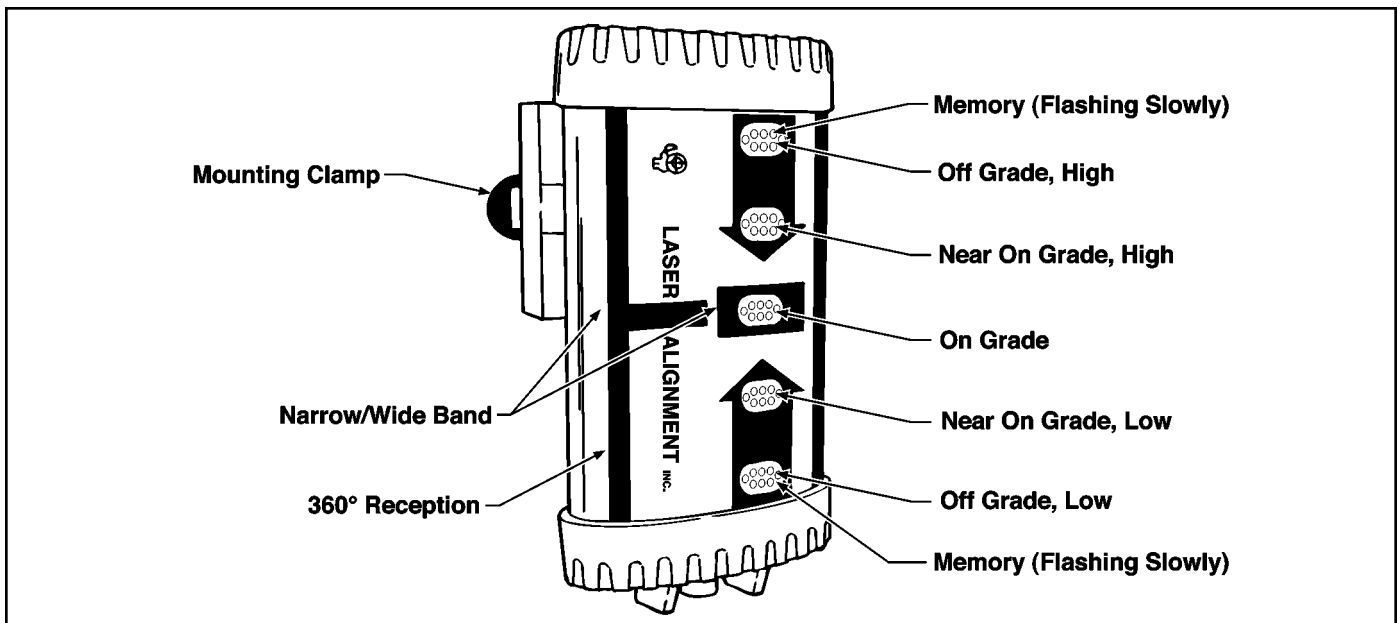


Figure 1-11 Laser Sensor Features

## SYSTEM FEATURES AND BASIC OPERATION

- **Wide/Narrow Band Selection.** The Laser Sensor allows for either a narrow or wide “On Grade” band. Operators can make the selection using the Narrow/Wide Switch on the Control Panel.
- **360° Reception.** The Laser Sensor has four rows of photo cells, two on each side. These photo cells can sense a plane of laser light from any direction.
- **Mounting Clamp.** The Mounting Clamp holds the Laser Sensor body to the mast pole.

### Laser Beacon

The Automatic Control System can operate with many models of Laser Beacons. The beacon must have a 360° rotating head with invisible or red beam and a speed of 8-40 RPS (Revolutions per Second). The faster the beacon’s speed the more optimally the system will perform.

The Laser Beacon is mounted on a tripod, which is located on the job site near where the box is operating. The Laser Beacon is the unit that creates the plane of laser light detected by the Laser Sensor.

The Laser Beacon transmits a focused plane of laser light up to 1000 feet (300 meters), optimal range for your Laser Beacon, as it rotates.

Laser Beacons are available in single grade, dual grade, and steep slope versions. They can be quickly and easily aligned to job site requirements without complicated calculation of angles.

A dual slope Laser Beacon can be set-up for level, single slope, or dual slope applications. Simply enter the required percent of grade and align the Laser Beacon to the axis (direction) to be graded.

- **Percent of Grade.** The change in elevation for every 100 feet (30 meters) graded.
- **Slope.** The change in elevation per foot (meter).

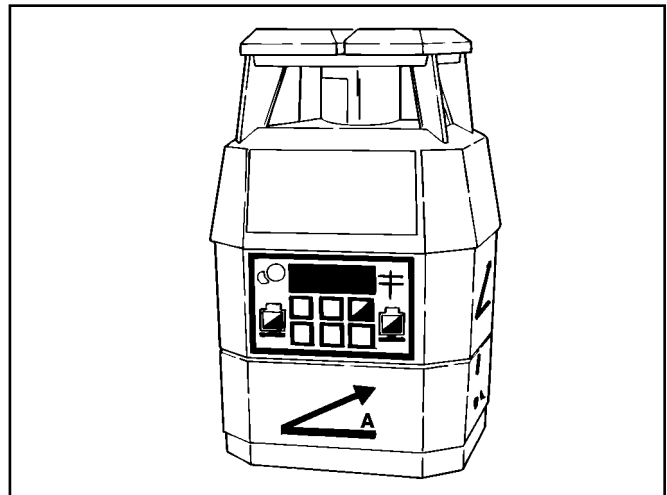


Figure 1-12 Laser Beacon

#### **WARNING**

You should never look directly into a laser light, as serious injury to the eye may occur. In general, incidental exposure of the laser to the eye will not do damage. However, you should avoid looking into the beam whenever possible. Instead, use the targets provided with the laser beacon system for viewing the laser spot.

#### **WARNING**

Use of any laser on a worksite is controlled by OSHA regulations found at 29 CFR 1926.54. You should familiarize yourself with these regulations before use of any laser beacon used in conjunction with this system. ATI Corporation recommends that you review all literature provided by the manufacturer of the laser beacon which you are utilizing in connection with this system. Do not utilize any laser beacon before you have familiarized yourself with the manufacturer’s literature.

#### **WARNING**

If this system is used in conjunction with a laser beam which might exceed five milliwatts, OSHA regulations require that employees working in the area shall be provided with anti-laser protection devices. Refer to the literature provided with your laser beacon. If you are unsure of the strength of the laser that you are using, you should require that all employees in the area wear anti-laser eye protection.

# SYSTEM FEATURES AND BASIC OPERATION

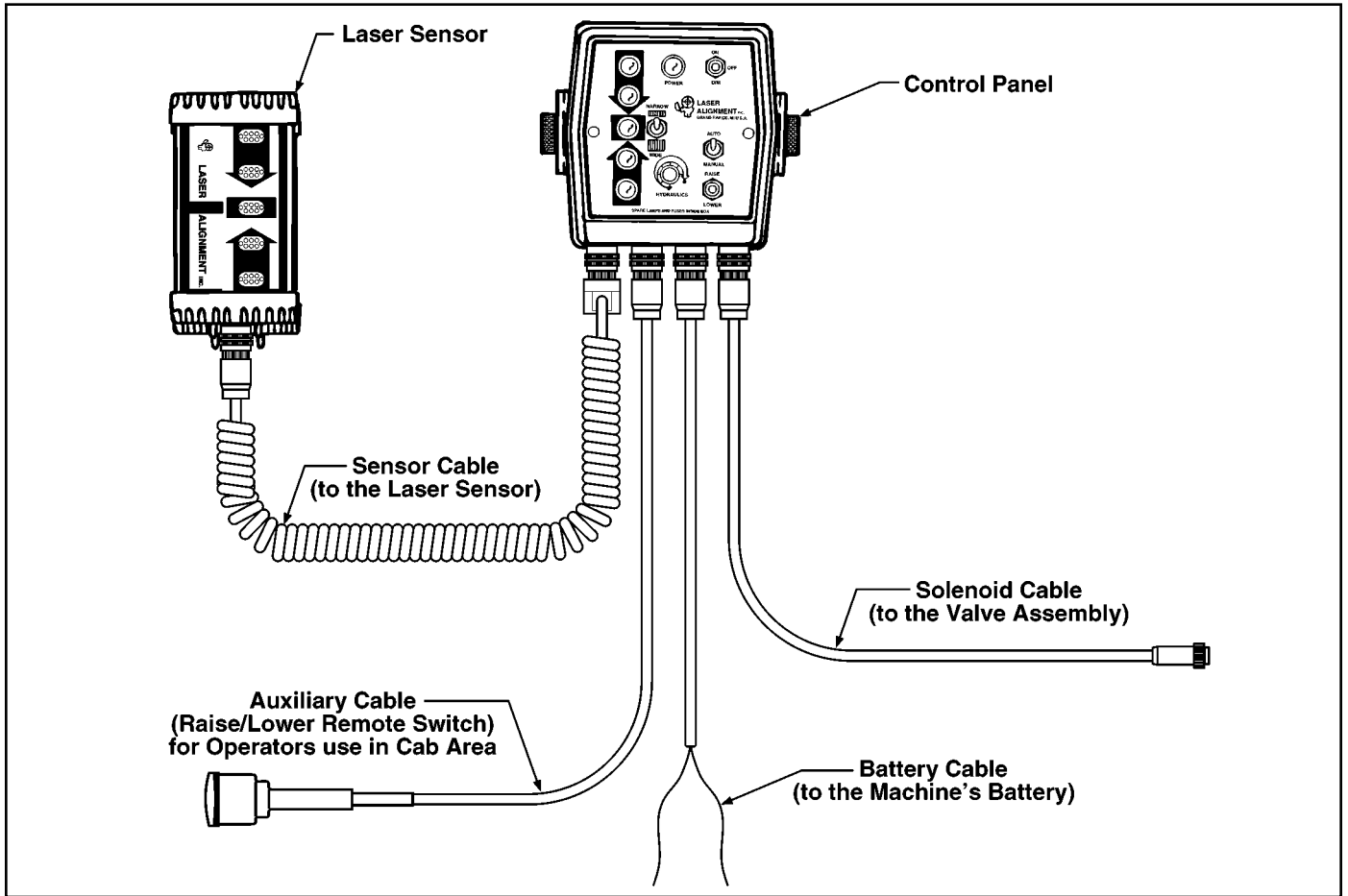


Figure 1-13 Single Automatic Control System

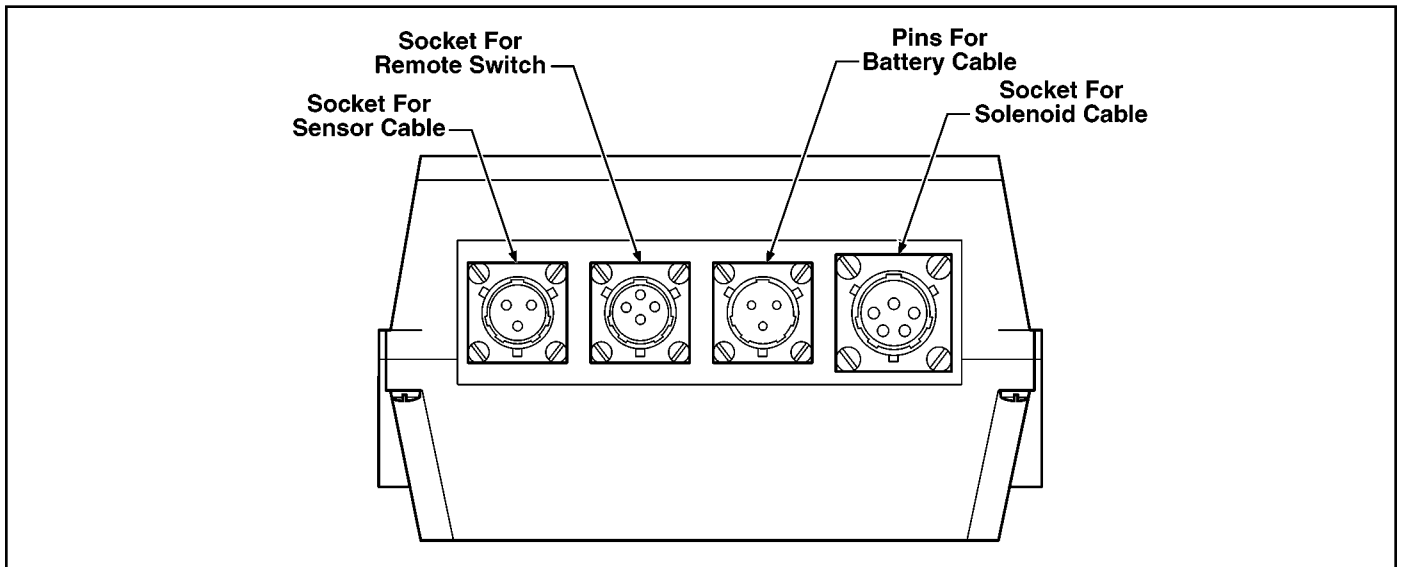


Figure 1-14 Bottom View of Control Panel

# SYSTEM FEATURES AND BASIC OPERATION

## Setting Up for Operation

The following are guidelines for setting up the Laser Beacon and Laser Sensor for both level job sites and sloped job sites:

- Choose a location for the Laser Beacon where obstructions, such as trees and buildings, can not block the plane of laser light. The Laser Sensor needs to be able to sense the plane of laser light at all times.
- Whenever possible, set up the Laser Beacon and the Laser Sensor at a height above the machine's cab. This prevents the cab or roll-over structure from blocking the plane of laser light as the machine moves around the job sites.
- The recommended head speed for the Automatic Control System is 20 RPS (Revolutions per Second). At 20 RPS, the Laser Beacon updates the Laser Sensor 20 times per second. If the Laser Beacon is powered by an external battery, you can set the head speed for 40 RPS for special applications.

## Set-Up for Level Grading

If the job site is to be level, the set-up of the Laser Beacon is simple. Since no slope is required in either axis, the Laser Beacon does not need to be aligned. The Laser Beacon will provide a level plane of laser light in all directions.

1. Locate the Laser Beacon following the guidelines above.
2. Apply power to the Laser Beacon. Level the Laser Beacon (some Laser Beacons will automatically level, others will need manual adjustment).
3. Set the counters for both axis at 0.000% (If needed, see the Laser Beacon Operation Manual).
4. Bench the machine. See the "Benching and Operating Your Machine" procedure in this section.

## Set-Up for Sloped Grading

If the job site is to be graded for a single or dual slope, the Laser Beacon requires its axis to be aligned for the job site. The Laser Beacon will then provide a plane of laser light at the required slope(s).

The following procedures are for two typical examples of job sites requiring sloped grades. Remember, each job site is unique, so consider the following methods as guidelines and not as the only methods possible.

### Method One:

1. Set a minimum of two grade stakes exactly in line with one of the axis to be graded.
2. Place the Laser Beacon in line with the two grade stakes. (Refer to Figure 1-15).

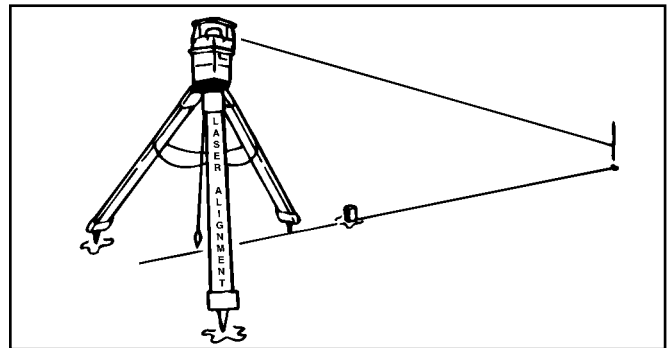


Figure 1-15 Method One: Align Laser Beacon with Grade Stakes

3. Switch on the Laser Beacon. Level the Laser Beacon (some Laser Beacons will automatically level, others will need manual adjustment).
4. Set the counter on the Laser Beacon for both axis to 0.0000% (If needed, see the Laser Beacon Operation Manual).
5. Roughly align one of the axis to the grade stakes by sighting over the top of the Laser Beacon (Refer to Figure 1-16).
6. Align the plane of laser light.

## SYSTEM FEATURES AND BASIC OPERATION

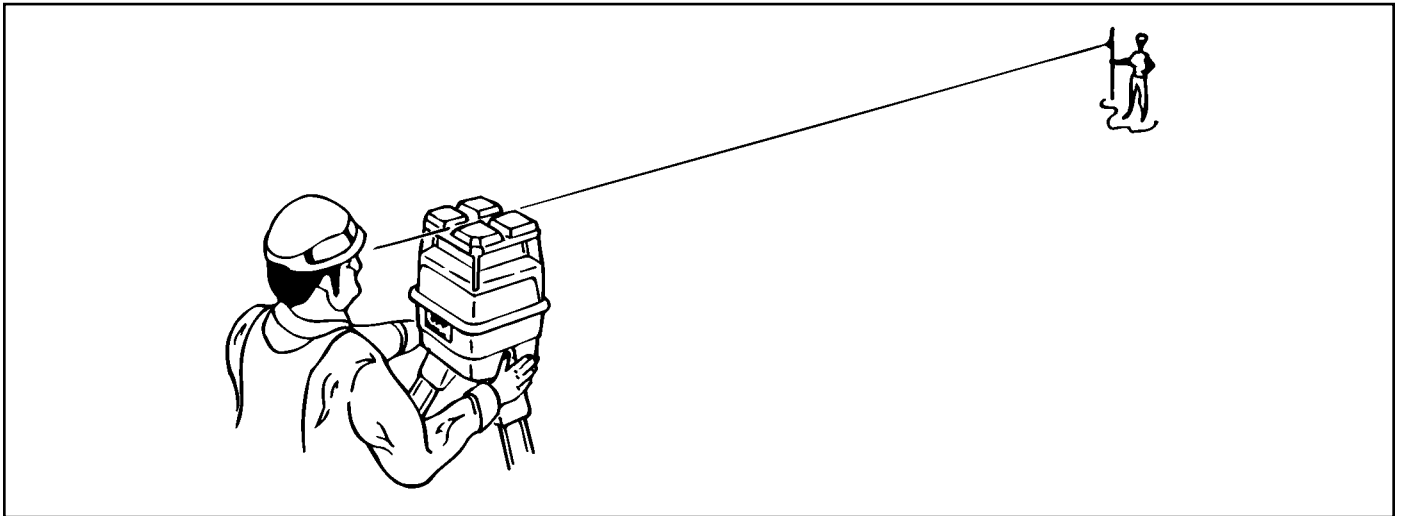


Figure 1-16 Sight Over Laser Beacon

- a. Set a grade Rod with Rod Eye Receiver on the far grade stake and adjust the rod until the Rod Eye Receiver indicates “On Grade.”
- b. On the axis not aligned with the stakes, enter on the Laser Beacon: 5.000%. Allow the Laser Beacon to level itself to this new position, if needed.
- c. Check the Rod Eye Receiver again.
  - If the Rod Eye Receiver indicates “On Grade”, the plane of laser light is aligned correctly.
  - If the Rod Eye Receiver indicates the plane of laser light is too high or too low, have a second person rotate the Laser Beacon on the tripod in small steps until the Rod Eye Receiver indicates “On Grade.”
7. Enter on the Laser Beacon the required percent of grade for each axis and allow the Laser Beacon to level itself again.
8. Bench the machine. See the “Benching and Operating Your Machine” procedure in this section.

### Method Two:

1. Set a minimum of two surveyed grade stakes as shown in the Figure 1-15. The stakes must have elevation information (Refer to Figure 1-17).

**Note:** This procedure requires that the elevations of the grade stakes are correct and aligned to the slope or percent of grade required.

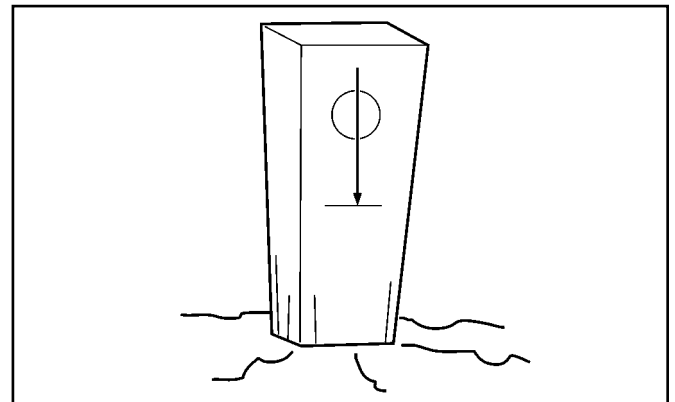


Figure 1-17 Grade Stake with Elevation Mark

2. Place the Laser Beacon a few feet (meters) behind the first grade stake and in line with one of the far grade stakes (It is not critical to align the Laser Beacon exactly) (Refer to Figure 1-18).

**Note:** Follow the guidelines at the beginning of this section when placing the Laser Beacon.

## SYSTEM FEATURES AND BASIC OPERATION

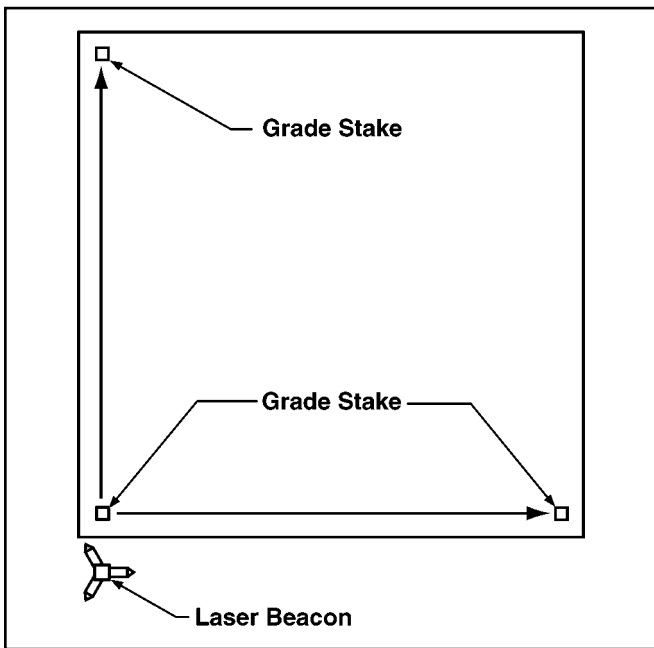


Figure 1-18 Method Two: Align Laser Beacon with Grade Stakes

3. Switch on the Laser Beacon. Level the Laser Beacon.
4. Roughly align one of the axis to the grade stakes by sighting over the top of the Laser Beacon (Refer to Figure 1-16).
5. Set both the counters on the Laser Beacon to the required percent of grade (If needed, see the Laser Beacon Operation Manual).

**Note:** The Grade Rod must be held plumb for each of the readings taken in the following steps.

6. Establish the H.I. (height of the instrument) for the plane of laser light.
  - a. Align the bottom of the Grade Rod to the mark on the near grade stake.
  - b. Adjust the Rod Eye Receiver up and down until it indicates “On Grade.”
  - c. Adjust the Rod Eye Receiver for any cut or fill amount indicated by the grade stake. (Refer to Figure 1-17).

- If the grade stake shows a cut, extend the Grade Rod and Rod Eye by the amount shown as a cut.
- If the grade stake shows a fill, lower the Rod Eye by the amount shown as fill.

7. Align the plane of laser light.

a. Align the bottom of a Grade Rod to the mark on the far grade stake.

b. Check the Rod Eye Receiver.

- If the Rod Eye Receiver indicates “On Grade,” the plane of laser light is aligned at the correct slope.
- If the Rod Eye Receiver indicates the plane of laser light is too high or too low, have a second person rotate the Laser Beacon on the tripod in small steps until the Rod Eye Receiver indicates “On Grade.”

**Note:** If it was necessary to rotate the Laser Beacon a significant amount at the far stake, then the original reading at the near stake may be out of tolerance. Check the setting again and make minor adjustments as required.

8. Bench the machine. See the “Benching and Operating Your Machine” procedure on the next page.

**Note:** If needed, you can check the elevations on both the plane of laser light and the grade stake elevations by setting the bottom of the Grade Rod at any stake’s grade mark and checking the Rod Eye Receiver for the “On Grade” indication.

# SYSTEM FEATURES AND BASIC OPERATION

## Benching and Operating Your Machine

Before beginning this procedure, the plane of laser light must be set at its proper slope. If needed, see the previous procedures in this section. This procedure explains how to set the Laser Sensor at the correct distance above the cutting edge of the box, and then how to operate the Automatic Control System.

### Benching

1. Move the machine to the area to be graded. Point it in the direction to be graded and use its controls to lower the cutting edge to a position that is finished grade, make a pass and double check your elevations, make any changes at this time.



If the Auto/Manual Switch on the Control Panel is in **AUTO** when the Power Switch is put to either its **ON** or **DIM** position, the Automatic Control System could move the box before an operator is ready. Follow this next procedure carefully. Failure to follow these instructions may result in serious personal injury to the operator.

2. Put the Auto/Manual Switch to **MANUAL**.
3. Put the Power Switch to **ON**.
4. Use the Narrow/Wide Switch to select narrow band for the “On Grade” tolerance.
  - Narrow. The band for fine or finished grading,  $\pm 0.25$ " tolerance.
  - Wide. The band for rough grading,  $\pm 0.60$ " tolerance.

**Note:** Use narrow band for benching.

5. Adjust the height of the Laser Sensor.
  - For Telescoping Masts, loosen the locking knob on the mast and raise or lower the Laser Sensor until its center (On Grade) Grade Position LED cluster becomes lit. Tighten the locking knob.

- For Non-Telescoping Masts, loosen the Mounting Knob for the Laser Sensor and raise or lower the Laser Sensor until its center (On Grade) Grade Position LED cluster becomes lit. Tighten the Mounting Knob.

**Note:** Most materials cut must later be compacted. To compensate for the compacting distance, lower the Laser Sensor. This raises the box’s cutting edge by the same distance. The distance you lower the Laser Sensor will depend on the material you are grading.

### Operation



Do not put the Auto/Manual Switch to **AUTO** until the machine is in the correct position. If the cutting edge is setting on hard ground and the Laser Sensor is above the plane of laser light, the machine may lift off the ground as the Automatic Control System attempts to move the cutting edge to “On Grade”. Failure to follow this instruction may result in serious personal injury to the operator.

1. Turn the Hydraulics Knob clockwise until it is fully opened.
2. Put the Narrow/Wide Switch to **WIDE**.
3. Put the Auto/Manual Switch to **AUTO**.
4. Drive the machine forward. The Automatic Control System constantly senses the plane of laser light to maintain the cutting edge of the box at the required elevation. Note the following as you operate the machine:
  - If needed, use the Auto/Manual Switch to go from automatic to manual control.
  - If needed, use the Raise/Lower Switch to control the cutting edge height manually. This switch allows you to control the cutting edge height in automatic or manual mode.

# SYSTEM FEATURES AND BASIC OPERATION

- In some situations, the Automatic Control System may require a cut deeper than the machine can handle. The machine may lose traction, stall the engine, or the wheel frame will be lifted off the ground to the maximum stroke of the cylinder as the cutting edge tries to reach finished grade. If this occurs, put the Auto/Manual Switch to **MANUAL** and use the Raise/Lower Switch to raise the cutting edge until the machine can push the material. Make multiple passes to cut the area to finished grade.

**Note:** In rough grading situations, use the Automatic Control System as an “Indicate Only” system and operate the machine under manual control. After the area has been rough graded, switch back to automatic control.

## TROUBLESHOOTING

If the Automatic Control System is not functioning properly, the first step is to determine the problem component. Use the information in this section to isolate the problem.

**Note:** The following test equipment is needed:

- Voltage/Ohm Meter
- Laser Beacon or Laser Simulator
- Cable Wiring Diagram (See cable schematics in this section).

**CAUTION** To prevent serious damage to the Automatic Control System, never replace fuses with fuses that have a higher amperage value

**CAUTION** The Automatic Control System is a highly sophisticated electronic system. Do not attempt repairs to the components. Contact Laser Alignment, Inc. or your local dealer if you have any problems.

## Most Obvious Causes (Check First)

- Is the power Switch on the Control Panel in either its ON or DIM position?
- Are the fuses good?
- Is the battery good?
- Is the Automatic Control System getting sufficient power from the battery?
- Are the cables all connected correctly and in good condition?
- Have you read and understood Section I of this manual?

## Control Panel (Refer to Figure 1-19)

1. Check if the Power Switch is in either its ON or DIM position.
2. Check the battery for power continuity and connection.
3. Check the power source (battery).
4. Check the fuses on the circuit board.
  - F1 (5 Amp). Power to lamps and hydraulics.
  - F2 (2 Amp). Power to circuit board electronics and Laser Sensor.

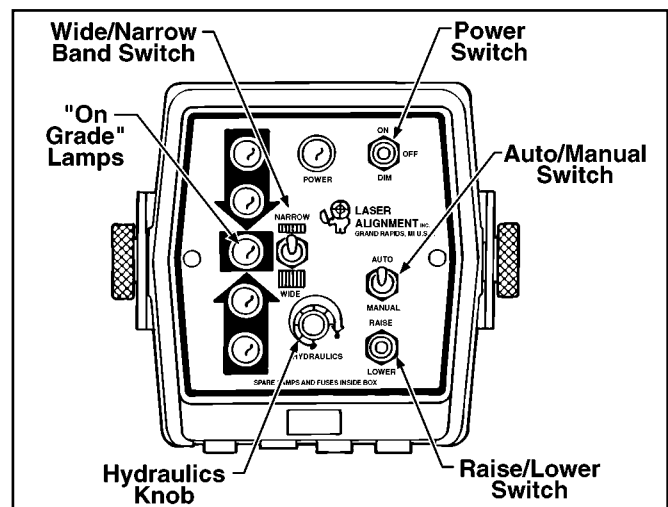


Figure 1-19 Control Panel

## SYSTEM FEATURES AND BASIC OPERATION

5. Check the lamps (Refer to Page 3).
6. Check if the Control Panel has been set-up correctly for the operation required.

### Laser Sensor

1. Check and clean the glass covering the sensor's photo cells.
2. Check the Fuse F2 in the Control Panel.
3. Check the cable to the sensor for proper continuity.
4. Check all cable connections for dirt, corrosion, bent or broken pins, etc.
5. Do the Grade Position LEDs become lit and go through the proper sequence when the Power Switch is put to either its ON or DIM position?
6. Do the Grade Position LEDs function properly when laser light from a Laser Beacon or Laser Simulator activates the photo cells?

### Cables

1. Check all cables periodically for wear, dirt, corrosion, bent or broken pins, or other damage.
2. Check cable continuity (See cable schematics in this section).

### Hydraulics

1. Check all hydraulic hoses and connections periodically for damage and wear.
2. Check all adjustments and locking nuts for tightness.
3. Check cables and electrical connections to the solenoid(s), and directional valve(s).
4. Check for cylinder leaks.

5. Check to make sure hydraulic knob is turned fully clockwise.
6. Check to make sure you are getting proper hydraulic flow to and from your power source.
7. Check the manual overrides on the directional valve(s) for proper function.

### Laser Beacon

1. Check to be sure the Laser Beacon is functioning properly by testing it with hand-held sensor (if available).
2. Check to be sure that the Laser Sensor is within the specified operating range of the Laser Beacon.
3. Check to be sure that the Laser Beacon's light is not reflecting off other surfaces (windows, windshields, mirrors, etc.) causing multiple readings by the Laser Sensor.
4. Check if rain, dust, engine exhaust, etc. is interfering with the Laser Sensor's reception.
5. Check if there is another Laser Beacon on the jobsite, causing multiple readings by the Laser Sensor.

# SYSTEM FEATURES AND BASIC OPERATION

CONNECTOR (3 Socket to Panel) CABLE; 20 feet (6 meters)

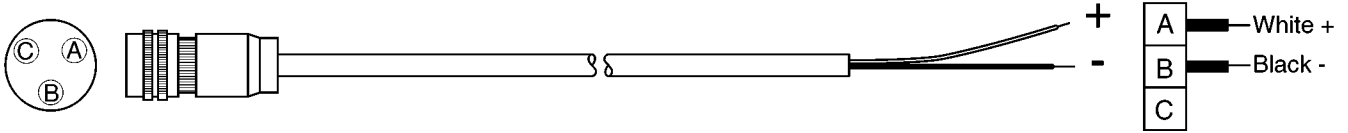


Figure 1-20 Panel to Battery Cable

CONNECTOR (4 Pin to Panel) CABLE; 10 feet (3 meters)

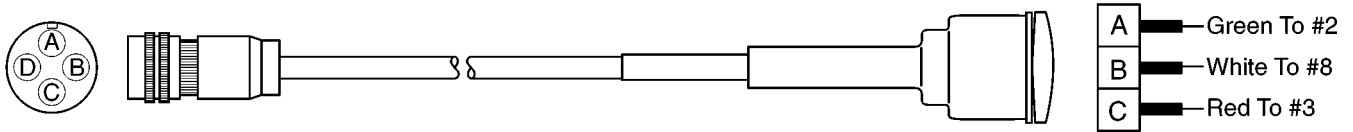


Figure 1-21 Remote Switch to Panel Cable

CONNECTOR, 90° (3 Pin to Panel) CONNECTOR (3 Socket to Sensor) CABLE; 15 feet (4.5 meters)

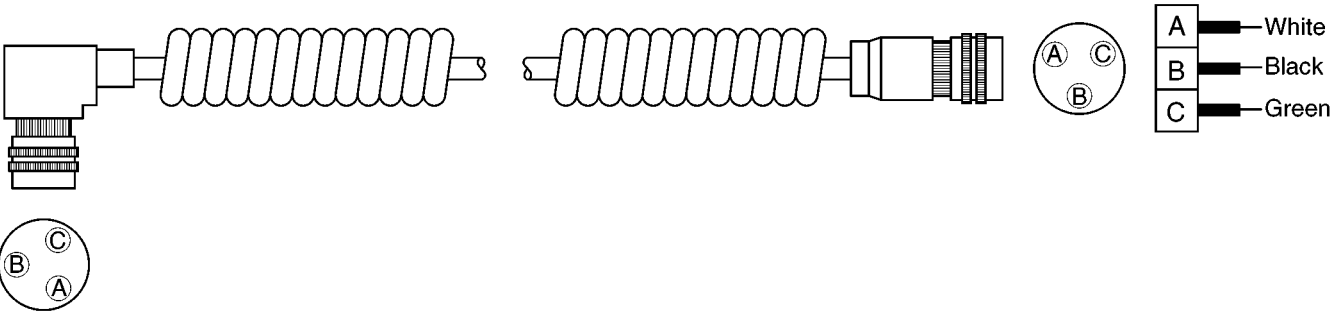


Figure 1-22 Coiled Sensor Cable

CONNECTOR (5 Pin to Panel) CONNECTOR (5 Socket to Valve) CABLE; 10 feet (3.04 meters)

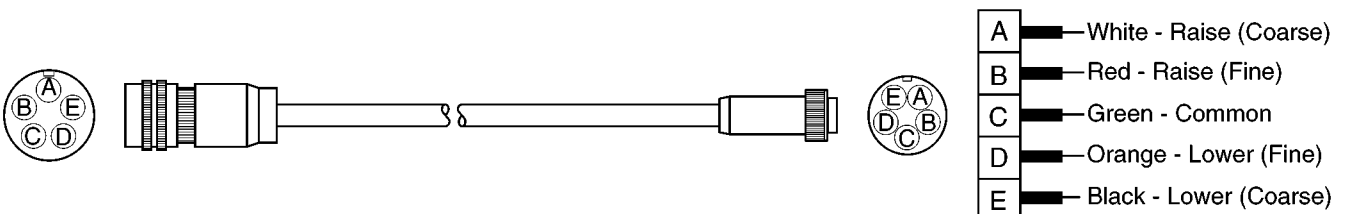


Figure 1-23 Solenoid Cable

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## SECTION II

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### GRADING BOX SET-UP

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Mounting the Control Panel Bracket .....	.16
Attaching Grader Box .....	.16
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# GRADING BOX SET-UP

## Equipment Set-Up For Skid Steer Grading Box

1. **Connect Power Cable** to battery power supply (**NOTE:** White wire is positive and black is negative). You will need to supply and install (2) crimp-on ends for the cable in order to securely attach to the battery posts. Place connector end of cable near the driver's seat for later connection to the Control Panel.
2. **Mount Control Panel Bracket** on the angle plate at the base of the Mast Pole. Use the bolts and nuts supplied. Install the Control Panel on the bracket using the side knobs to secure the unit. (Refer to Figure 2-1).

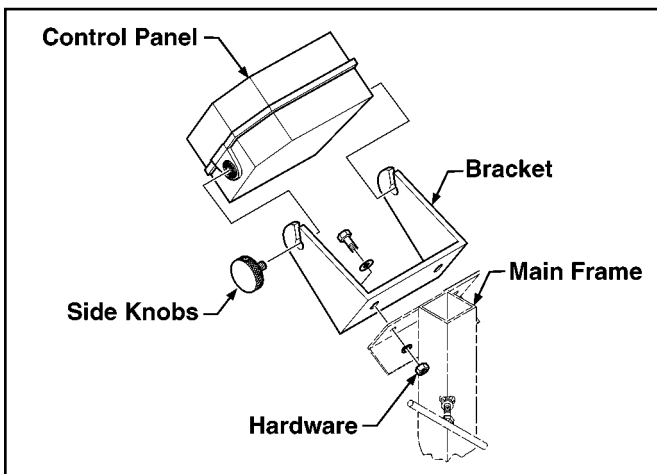


Figure 2-1 Control Panel Mounting

3. **To attach Grading Box**, position on a level area. Start Skid Steer and drive up to the attachment plate and secure per manufacturer's directions. The Level Best Attachment Plate is designed to be universal. If the Skid Steer's Pins do not fit securely into the rectangular holes at the base of the Attachment Plate, these holes can be notched larger to accept the pins. Turn the Skid Steer engine off.
4. **Connect the Grading Box's Hydraulic Hoses** with Quick Couplers to the Auxiliary Hydraulic Ports of the Skid Steer. The Grading Box's Hydraulic Manifold is marked with a "P" and a "T" where the Hoses enter. The "P" Hose should be connected to the "P" port and the "T" Hose to the "T" port of the Tractor's Auxiliary Hydraulics.

(NOTE: "P" means pressure [supply] and "T" means tank [return]). Refer to the Skid Steer Owner's Manual for identifying the "P" and "T" Auxiliary Hydraulic Ports.

5. **Insert Mast** in holder until it rests at bottom of tube and tighten with tee handle at base. Clamp the Laser Sensor near the top of the Mast so it is higher than any local obstruction including Skid Steer cab or fall protection devices. (Refer to Figure 2-2).
6. **Connect the straight end of the Sensor Cable** to the base of the Laser Sensor and the 90° end to the Control Panel. All cables will only attach to the proper connectors (Refer to Figures 1-13 & 1-14).
7. **Connect Solenoid Cable**, from the Grading Box's Hydraulic Manifold to Control Panel.
8. **Connect Power Supply Cable**, that was wired to the battery, to Control Panel.
9. Set the Hydraulic Speed Knob on the Control Panel between 2 p.m. and 4 p.m. This knob adjusts the speed at which the hydraulics respond to the laser beam signal. Level Best recommends these settings for optimum operation speeds. Set the Wide/Narrow Switch to wide band and the Automatic/Manual Switch to manual. **Always have system in Manual Setting when not operating the tractor.**
10. While watching the Laser Sensor, test the power by moving the switch on the Control Panel marked On/Off/Dim to "On" position. The Laser Sensor will perform a diagnostic check by blinking in each of the 5 settings. If any light remains lit, a cell is not operational. You should contact your Dealer for replacement. The Control Panel's Red Power Lamp should be illuminated indicating that power is "On". Turn Power Switch off.

## GRADING BOX SET-UP

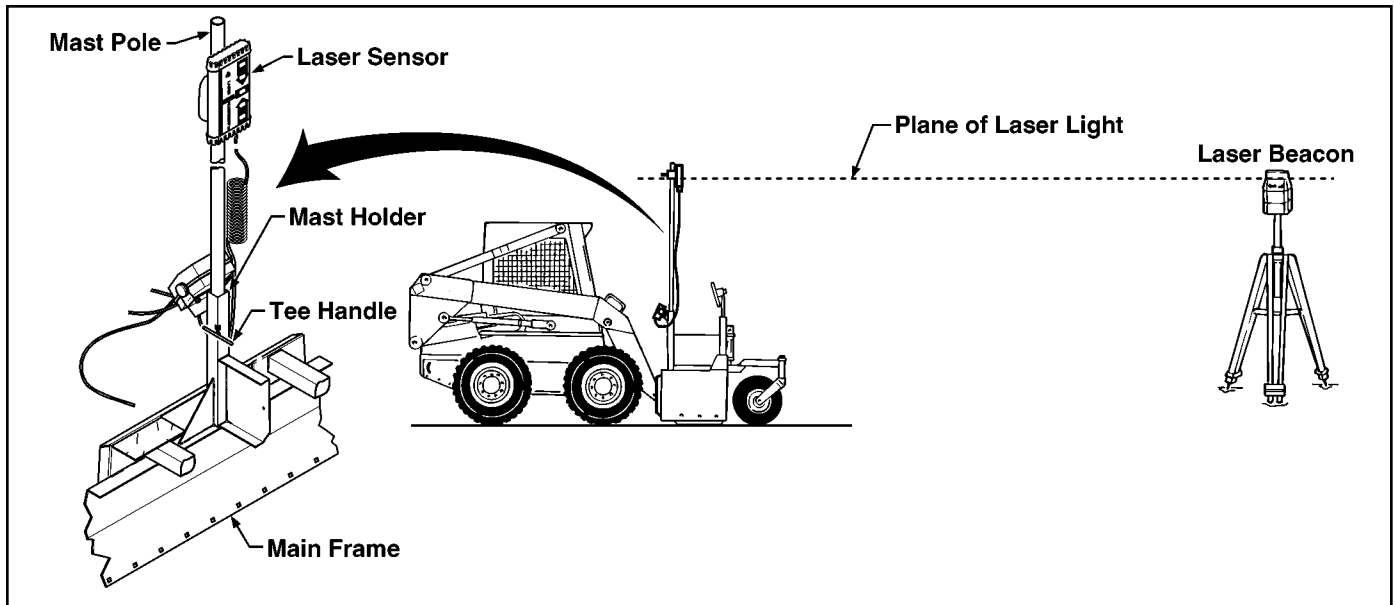


Figure 2-2 Components of the Automatic Control System

11. **To set up the Laser Sensor** follow the process listed below:

- a. Set-up a Laser Beacon with a 360° rotating head and a red or invisible beam with a speed of 8-40 RPS (Revolutions per Second). Turn on the Laser Beacon. Attach the Rod Eye to a measuring pole and turn on. Set the base of the measuring pole on the benchmark. Adjust the measuring pole so the Rod Eye emits a solid “On Grade” tone (compensate for slab thickness and compaction if needed).
- b. Find an area to be graded that is close to specified grade. Start the skid steer, engage the auxiliary hydraulics and move the Skid Steer and Grading Box to that location. Raise or lower the Grading Box’s Cutting Edge until it is even with the bottom of the measuring pole when the Rod Eye is emitting the “On Grade” tone, or resting on the ground if already at grade.
- c. Making sure that the Control Panel’s Auto/Manual Switch is on manual and the Narrow/Wide Switch is on Narrow Band, move the Laser Sensor to a height on the Mast Pole where it indicates the beam in the “On Grade” position, and is unobstructed by any object (**NOTE:** Operator may prefer to turn the face of the Laser Sensor towards the

operator for easy viewing). You have now calibrated the Grading Box.

- d. When seated in the Operator’s seat, start the Skid Steer and move the Automatic/Manual Switch to automatic.
- e. Set the Control Panel’s Narrow/Wide Switch to Wide Band to begin the grading of large or medium sub base material. Narrow Band can be used for final grading or grading of fine sub base material (ie: sand). When grading in Narrow Band, the speed of the Skid Steer needs to be decreased for optimum finish.
- f. Take several passes with the Grading Box and turn off the Skid Steer. Place the base of the measuring pole on the graded area to confirm finish grade elevation.

The goal is to drive over the area to be graded with a 1/2 full box of material, with the Control Panel’s Green Light always illuminated.

## Troubleshooting

1. If the Grading Box initially appears to be “cutting excessively”, it signals that you are significantly above grade and the automatic controls are trying to set to grade in one pass. You should switch the control panel to manual mode and use the Raise/Lower Switch until you are able to remove the appropriate amount of material with several passes. The Raise/Lower Switch is used to manually control the height of the Grading Box, or override the laser system’s automatic controls. This allows you to gradually smooth excessively high spots.
2. Blinking Control Panel or Laser Sensor light indicates the last elevation prior to passing out of the laser beam. Readjust the height of the Grading Box until signal is found. Your Laser Sensor or Laser Beacon height may need to be adjusted if this situation continues to occur, or you may need to switch to manual until you get closer to grade.
3. If the Grading Box raises and lowers in reverse of it’s commands, the Hydraulic Hoses might be backwards. Switch Hoses at the Auxiliary Hydraulics’ ports.
4. The Grading Box is extremely “jumpy”. Your hydraulic correction speed might be set too fast. Decrease the hydraulic correction speed by slightly turning the Hydraulic Knob on the Control Panel counter-clockwise.

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## SECTION III

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### SPECIFICATION AND MAINTENANCE

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# SPECIFICATIONS AND MAINTENANCE

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## Specifications

### Automatic Control System

Operating Temperatures . . . . .	0° to 115° F (-18° to 46° C)
Storage Temperatures . . . . .	-10° to 150° F (-23° to 65° C)
Input Voltage . . . . .	12/24 Volts dc (Reverse Voltage Protected)
Current Requirements . . . . .	1 Amp (Manual Control) 2 Amp (Automatic Hydraulic Control)
Output to Solenoids . . . . .	12/24 Volts (Dependent on Input)
Fuses (On Circuit Board) . . . . .	5 Amp — Lamps and Hydraulic Outputs 2 Amp — Electronics and Laser Sensor

### Control Panel

Dimensions . . . . .	7.4 x 7.8 x 4.5 in. (18.7 x 19.8 x 14.4 cm)
Weight . . . . .	4.5 lbs. (2.0 kg)
Seal. . . . .	Water Resistant

### Laser Sensor

Band Widths	
Narrow . . . . .	0.3 - 0.4 in. (0.8 - 1.0 cm) "On Grade" 0.25 in. (0.60 cm) "Near On Grade"
Wide . . . . .	0.6 - 0.8 in. (1.5 - 2.0 cm) "On Grade" 0.6 in. (1.5 cm) "Near On Grade"
Sensor Pick-Up Range . . . . .	8 in. (20 cm)
Laser Requirement . . . . .	All Rotating Lasers (HeNe or Infrared)
Input Voltage . . . . .	12/24 Volts dc
Input Current . . . . .	Less Than 1 Amp
Pulsed Display . . . . .	10 Pulses Per Second
Operating Range . . . . .	1000 ft. (300m) Radius
Weight . . . . .	7.5 lbs. (3.5 kg)

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# SPECIFICATIONS AND MAINTENANCE

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## Maintenance

The rugged and durable Automatic Control System is built to last. But as with all equipment, a few minutes of routine care, maintenance, and cleaning can extend the life of the system.

### Storage and Transport

Most often the grading box and its hydraulic controls remain on your machine. However, you should store the Control Panel, Laser Sensor, Coiled Sensor Cable and Solenoid Cable in a safe place when not in use. Protect the cable connections by installing the covers supplied.

### Cleaning

The Laser Sensor is completely sealed and purged with dry nitrogen. It requires no maintenance other than periodic checking to be sure its mounting structure is tight and secure.

The Control Panel is water resistant. It can be cleaned with mild soap and water, and a soft cloth. Do not submerge the Control Panel or direct high pressure spray at it.

### Cables and Hoses

Check all cables and hoses regularly for signs of wear and damage. Keep cable connections clean and free from dirt and corrosion. If a cable has been damaged, do not attempt to repair. Incorrect or poor connections can cause damage to your Automatic Control System.

When applicable, check the hydraulic hoses. Look for areas where the hoses could rub against each other or another object as they expand and contract under pressure. Check the hydraulic fittings for tightness.

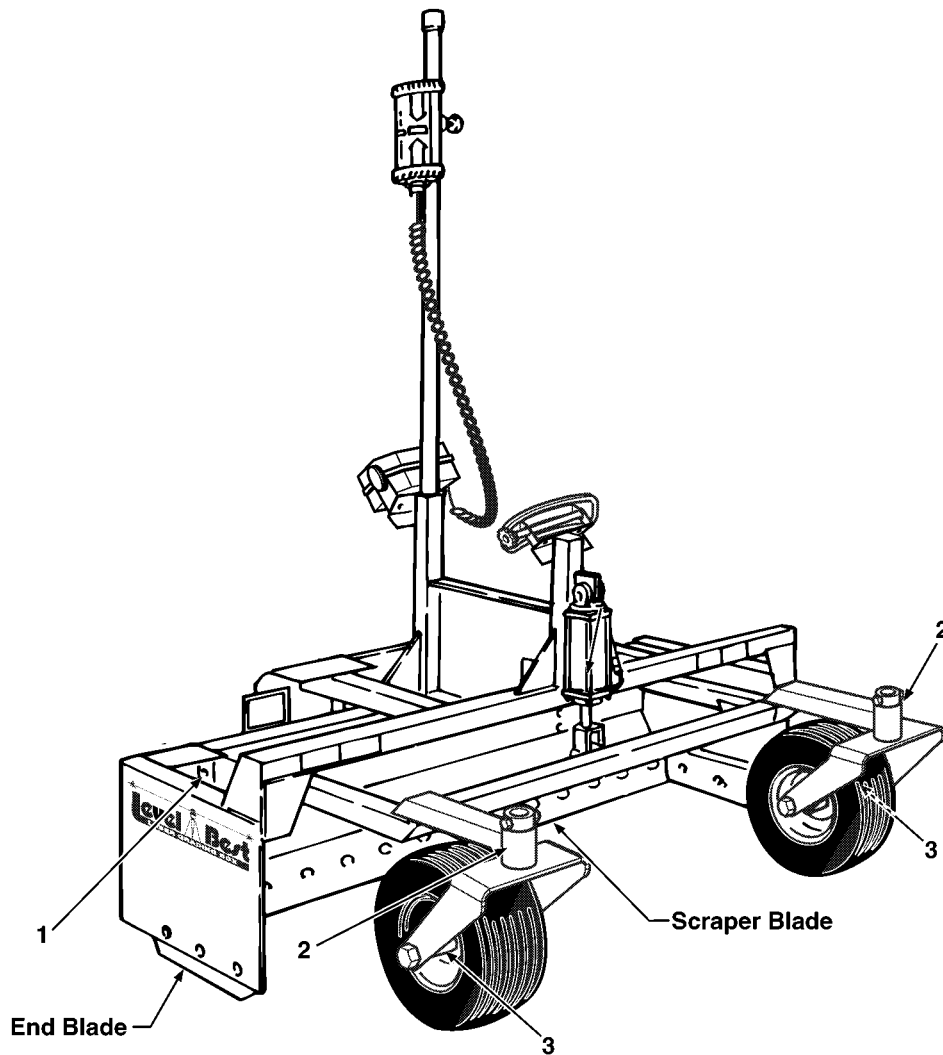
## Machine

Check your machine routinely for wear to its components. Refer to the manufacturer's specifications in the machine's Service Manual. Pay particular attention to areas that affect the Automatic Control system function and accuracy, such as looseness or play in the cylinders or wear on the box's cutting edge. Contact the manufacturer's dealer for service and repair.

### Calibration

Perform periodic calibration checks of the Laser Beacon System, as outlined in its Operation Manual, to ensure accurate performance.

# SPECIFICATIONS AND MAINTENANCE



ITEM	NAME	FREQUENCY	LUBE TYPE
1.	Wheel Frame Pivot Pins (2)	Daily	EP*
2.	Spindle Pivot (2)	Daily	EP*
3.	Wheel Hub (2)	Daily	EP*

\* EP - Multi-Purpose Grease.

**NOTES:**

1. All grease fittings are SAE standard.



**Worn grease fittings that will not hold the gun and fittings with a stuck check ball, must be replaced.**

2. Check Hydraulic System Components for wear and /or leaks.

3. Check and tighten all bolts and nuts for scraper blade and end blades, weekly.

Figure 3-1 Lube and Maintenance Chart

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## SECTION IV

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### REGISTRATION

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# REGISTRATION CARD

**By buying this product, you, the purchaser of this product, agree to the following:**

To the fullest extent permitted by law, the purchaser of this product shall indemnify and hold harmless ATI Corporation and its authorized dealer from and against claims, damages, losses and expenses, including but not limited to attorney's fees, arising out of or resulting from the use of the product, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property, but only to the extent caused by the negligent acts or omissions (Including but not limited to misuse or alteration of the product) of the purchaser, anyone directly or indirectly employed by the purchaser or anyone for whose acts the purchaser may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder.

In claims against any person or entity indemnified under this agreement by an employee of the purchaser, anyone directly or indirectly employed by the purchaser or anyone for whose acts the purchaser may be liable, the indemnification obligations shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the purchaser under workers' compensation acts, disability benefit acts or other employee benefit acts.

## CUSTOMER COPY

Dealer \_\_\_\_\_ Date Installed \_\_\_\_\_

Grading Box Model # \_\_\_\_\_ Serial # \_\_\_\_\_

Control Panel Model # \_\_\_\_\_ Serial # \_\_\_\_\_

Laser Sensor Model # \_\_\_\_\_ Serial # \_\_\_\_\_

Dealer Name \_\_\_\_\_

Street \_\_\_\_\_

City, State, Zip \_\_\_\_\_

Telephone \_\_\_\_\_ Fax \_\_\_\_\_

Signature \_\_\_\_\_

DETACH AND MAIL TO ATI CORPORATION • 250 EARLAND DRIVE • NEW HOLLAND, PA 17557



## MANUFACTURER'S COPY

Dealer \_\_\_\_\_ Date Installed \_\_\_\_\_

Grading Box Model # \_\_\_\_\_ Serial # \_\_\_\_\_

Control Panel Model # \_\_\_\_\_ Serial # \_\_\_\_\_

Laser Sensor Model # \_\_\_\_\_ Serial # \_\_\_\_\_

Customer Name \_\_\_\_\_

Street \_\_\_\_\_

City, State, Zip \_\_\_\_\_

Telephone \_\_\_\_\_ Fax \_\_\_\_\_

Signature \_\_\_\_\_